

-007-001

**COLLIS EQUIPMENT IN THE "CANBERRA"**  
**Mechanised Handling of Stores and Baggage**

A NOVEL system of mechanised baggage and stores handling is employed in the new P. & O.-Orient passenger liner Canberra. It has been specially developed for the ship by J. Collis & Sons Ltd., the Mechanical Handling Engineers. The Canberra, a ship of 45,000 tons gross carrying more than 2,000 passengers, has been built at Belfast by Harland & Wolff Ltd.: she is the largest passenger liner to be built in the United Kingdom since the Queen Elizabeth was completed more than 20 years ago, and she is notable for the great care that her owners have put into every aspect of her design.

The Canberra and Oriana are both larger and faster than their owners' previous ships, and if full advantage was to be taken of the higher speed achieved at sea it was essential that it should be balanced by quick turnaround times in port. It was therefore decided to mechanise the handling of passengers' baggage. On a run as long as that to Australia passengers usually have a good deal of baggage, both for use on the voyage and for stowing in the baggage room. Baggage destined for passengers' cabins is normally handled by stewards with the aid of the passenger lifts, being carried into the ship by hand, while that destined for the baggage room is probably handled by the ship's derricks or cranes.

For the Canberra, J. Collis & Sons Ltd. have designed a system of slat conveyors combined with an automatic baggage elevator which eliminates a great deal of the manual effort previously needed, with a consequent saving in time. They have also designed a slat conveyor installation to handle the ship's stores. Although designed specially for the ship, the equipment is based on components from the firm's range of mechanical handling equipment which has been used in industry for many years, and is therefore well proved in service. The equipment was manufactured at one of the firm's factories, at Barry, Glamorgan, where various types of conveyor equipment are made.

**J. Collis & Sons Ltd.**

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Before commencing the design of the Canberra's installation it was necessary to find out the precise requirements that it would have to meet. Collis engineers therefore surveyed the existing methods of loading and discharging baggage in P. & O. liners, loading being observed in the Iberia and discharging on the Arcadia. In the case of the Arcadia a portable belt conveyor was used experimentally for time and motion studying the handling of baggage, and this allowed the factors limiting speeds of handling with this type of equipment to be determined. It was found that the limiting factor was the speed with which the baggage could be got on to the conveyor, by stewards when discharging and by stevedores when loading.

The Collis equipment installed in the Canberra consists of entirely separate systems for handling baggage destined for the cabins and baggage destined for the baggage room. There are also rather similar, though simpler, conveyors for the handling of stores. In every case the conveyors are housed within the ship when at sea, and when in use are extended through doors in the ship's side until they bridge the gap between ship and quay. These side doors are on E Deck, quite low in the ship, and their use reduces the distance that baggage and stores have to travel. There are eight openings, two aft on either side of the ship for baggage, and two forward on either side for stores. It is of interest that at the latest Safety of Life at Sea Conference, held in London in 1960, a proposal to restrict the number of such side openings in passenger liners was successfully opposed by the United Kingdom delegation on account of the promise which it felt these baggage handling systems offered.

In the Canberra, baggage destined for cabins is brought into the ship by a Collis cross-deck conveyor - a multiple conveyor that can be extended out of the ship either to port or to starboard. The baggage is removed from the conveyor by stewards and loaded into a special baggage elevator which automatically discharges it at the correct deck. In the case of baggage not required on the voyage, a separate system of conveyors, working through two openings arranged one on each side of the ship a little further aft, moves the baggage straight from the quay into the baggage room. Stores

are loaded by means of four more conveyors arranged forward in the ship, two on each side. Each conveyor is run out through its own side door, and one of the four is portable and can be used to supplement any of the other three if required.

#### Cross-deck Conveyor and Baggage Elevator

The cross-deck conveyor that handles the baggage moving to and from cabins consists of a group of three inter-connected slat conveyors, each based on The Collis Slatveyor. The centre conveyor is 15 ft. 6 in. long and the side conveyors 29 ft. 6 in. long. All three are mounted on a gantry which can be traversed along an alleyway extending from one side of the ship to the other. The gantry is carried on rails mounted on the deckhead above, and is driven across the ship by a pinion which engages with a rack on the deckhead. The power for this, and for all other drives, is provided by single-speed squirrel cage motors fed from the ship's 440-volts A.C. electrical supply.

When it is in the working position the gantry extends through one or other of the side doors, depending on which side of the ship is adjacent to the quay, and one of the side conveyors is wholly outside the ship in the manner shown in the accompanying illustrations. The remaining two conveyors extend across the alleyway at a height of 27 in., and the baggage is removed from them by stewards as it passes the baggage elevator. This elevator is installed immediately forward of the conveyors and to starboard of the centreline of the ship, so that a greater length of the conveyor is employed when the ship is loading or discharging through the port side door.

The conveyors employ a novel design of slat, which provide a travelling surface without gaps. Neoprene inserts in each slat gives good frictional qualities so as to prevent baggage slipping. The slats are carried on roller chains passing over sprockets at each end of the conveyor. The gaps between the centre and side conveyors are bridged by Neoprene rollers driven by chains from the main drive shafts, and are thus synchronised with the conveyors.

The outboard end of the outer conveyor is hung from the end

of the gantry by means of two wire ropes operated from a 3-h.p. winch. When in use it is lowered until a roller comes into contact with the quay, when the upper surface of the conveyor is about 30 in. from quay level. The equipment is designed to operate satisfactorily with the outboard conveyor at any angle between 15 deg. elevation and 30 deg. depression. This is sufficient to meet the P. & O.-Orient requirements for tidal variations and differences in the trim and draught of the ship.

When a ship is secured alongside a quay under tidal conditions it is impossible for her wires to be taut, and she may range a little in a fore and aft direction. This could damage a conveyor extending between ship and shore if it were too rigidly mounted. The design of the Collis conveyors for the Canberra has several special safety features to prevent such damage. The two rollers at the end of the conveyor which rest on the quay, one when the conveyor is tilted upwards and the other when it is tilted downwards, are mounted in frames of pantograph type which can accept a certain amount of lateral movement, while the pivots at the inner end are carried in spring-loaded bearers allowing a certain amount of angular movement in a horizontal plane. If the permissible movement at either end is exceeded, a limit switch is operated and the hoist winch raises the conveyor clear of the quay. The operator then stops the winch when the conveyor is clear, and lowers it again when ranging has ceased.

The conveyors are designed to run at a speed of 60 ft. per minute, with a load capacity of 50 lb. per foot run.

When the incoming baggage has been removed from the cross-deck conveyor, it is loaded into the baggage elevator. This is a specially designed version of The Collis VertiVeyor, in which a pair of endless chains run continuously and carry baggage trays spaced at approximately equal intervals. The lift serves five decks - A, B, C, D and E - and passes through the Promenade Deck between B and C Decks, where no service is required. The two chains run over sprocket wheels at the top and bottom of their travel, the upper pair being the drive wheels and the lower pair being used to apply the necessary tension to the chains.

The elevator operates in totally enclosed steel trunking, and at each operating deck there is a loading and a discharge station with automatically-operated fire and smoke-proof doors. At a loading station, the required amount of baggage is placed on the loading table, which is external to the trunking and has a loading gauge to ensure that the maximum size of load that will fit the carrier tray is not exceeded. The operator then presses the selector button for the required discharge deck, and the remainder of the operation is automatic. As the next empty carrier approaches, the fire doors open, the load is moved into the path of the carrier and the fire doors shut again. When the required discharge deck is reached the load is deposited on to a discharge platform which has moved into the elevator. This then withdraws through the fire doors which have been automatically opened, and a pneumatically-operated thruster transfers the baggage from the platform down a chute to the deck.

To achieve this sequence of automatic operations, two main principles are employed. The first is that all working surfaces are in the form of fingers cantilevered out from a crossbar, and arranged so that the fingers of the carrier pass between the fingers of the loading and discharge platforms from which and on to which it picks up and unloads baggage. The other is that all operations are electro-pneumatically controlled, and are initiated by selector bolts on the carriers. These selector bolts run through the fingers of the carriers, and each bolt initiates the operations for one particular discharge deck. The press buttons in the control panel operate selector levers, and the pressing of a button moves the relevant selector lever forward so that it operates the corresponding selector bolt on the carrier as the latter goes by. This bolt has now been pushed in at one end and therefore protrudes at the other end, where it strikes a series of switches as the carrier approaches and passes the discharge deck required, thus initiating the various operations in their correct sequence. As the tray passes round the bottom sprocket after discharging its load, a striker plate resets all the selector bolts, and sets one which indicates that the carrier is empty and will initiate loading operations at any deck where

a button has been pressed. The various operations are carried out by pneumatic cylinders and these are controlled by electric solenoids which in turn are operated by the switches.

The carrier trays consist of a flat base composed of fingers, as already described, carried by two side-brackets. At their upper ends the brackets terminate in pivots which are attached to the chains. Between the sprocket wheels the chains run in channel guides, and spigots protruding from the base of each carrier at either side also engage in these guides, and so prevent any tilting of the trays if they are unevenly loaded with baggage.

The trays are loaded as they go up and discharged as they descend, and so pass over the upper sprockets loaded with baggage. The channel guides must of necessity terminate short of the sprockets, and some device is therefore needed to ensure that the trays remain upright as they pass over the top sprocket, both to avoid any chance of baggage falling off at this point and to ensure that the tray spigots re-engage in the channel guides on the descending side.

The device used is called a stabiliser. It consists of a small trolley running between rails above the upper sprocket wheels, and carrying short vertical sections of channel guide. When at rest the stabiliser trolley is held at one end of its rails by a weight, which is connected to the trolley by a wire passing over a pulley. In this position the trolley guides marry up with the channel guides on the ascending side. As a carrier tray comes up to the upper sprockets its pivots and spigots engage in the trolley guides, and it draws the trolley along its rails while the trolley maintains the carrier in a vertical position. As the carrier tray begins to descend it engages in the channel guides on the descending side, and the stabiliser trolley then returns to its original position, ready for the next carrier, under the action of the weight.

To avoid any chance of baggage being carried round the lower sprocket wheels due to a failure at a discharge station, the discharge station at the lowest deck (E Deck) is of a special type. The discharge platform is fixed in the path of the carrier trays, combing their fingers as they pass, and the fingers of

this discharge platform carry individual slat conveyors which run continuously, and so remove any baggage from the platform before the next carrier passes.

#### Baggage Room Conveyors

The conveyor arrangements for the handling of baggage to and from the baggage room are generally similar in principle to the cross-deck conveyor already described. In this case there are two swan-necked conveyors permanently installed between the side doors to port and starboard and the baggage room on the deck below (F Deck), while a gantry that can be traversed along an alleyway extending across E Deck carries two conveyors, one at either end, one or other of which provides the link between side door and quay. The outboard end of these conveyors is lowered by two wire ropes, as with the cross-deck conveyor. However in this case the inboard end of the conveyor in use must also be lowered, and this is done by a pair of lead screws. The safety arrangements for dealing with the ranging of the ship are the same as those that have been described already.

#### Stores Conveyors

The stores conveyors are simpler than those for baggage, each unit consisting of a single slat conveyor. In the case of the three permanently installed units, this conveyor is carried by a gantry which runs outboard, and lowers the conveyor into position between side door and quay by means of wire ropes and lead screws. The fourth conveyor, which is portable and can be used to replace any of the other three if necessary, has no gantry and must be specially rigged in whichever position it is to be used. The stores conveyors can be operated at any reasonable angle of elevation or depression, it being possible to raise the conveyor between the arms of its gantry. To avoid any chance of stores slipping, the slats have Neoprene inserts and upstands are provided at regular intervals.

Many of the design features are entirely new and numerous British and Foreign Patents have been applied for.

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# JOHNSON & PHILLIPS LTD.

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## J. & P. PROPULSION CABLES FOR THE

### NEW P & O/ORIENT LINER

#### " C A N B E R R A "

Johnson & Phillips Ltd. supplied all the main propulsion cables for the turbo-electric installation of the P & O/Orient Lines' magnificent new passenger vessel "Canberra".

The installation develops 85,000 shaft h.p. on two propellers and the cables are required to operate at 6,000 V on a 3-phase system. This is the first time in the history of shipbuilding that a voltage as high as this has been used on a passenger vessel.

Due to the heavy load to be carried by the cables two single core cables per phase, operating in parallel, are installed to supply each of the four half motors which comprise the Canberra's 42,500 h.p. port and starboard engines. This involved two runs, of 12 cables each, whilst a further run of 24 cables interconnects the vessel's two 32 MW alternators.

The cables installed are 1.25 sq.in. single core, paper insulated, lead alloy sheathed and cotton braided, and finished with a fire resistant compound. They are of the mass impregnated, non-draining type, with a nominal overall diameter of 2.08". Owing to the vital role they play in the operation of the ship J. & P. were called upon to joint them.

3,000 V cables of similar construction and finish were also supplied and jointed by J. & P. for the transmission of power to the docking propeller equipment situated in the bows of the Canberra.

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A photograph of a J. & P. jointer at work on the cables which interconnect the alternators can be supplied on request to Johnson & Phillips Ltd., Publicity Department, Victoria Works, Charlton, S.E.7. (Telephone No. GREENWICH 3244 Ext.317).

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RADIO INSTALLATION IN "CANBERRA"  
Comprehensive Communications Equipment And  
Television System

The new 45,000-ton luxury liner Canberra, sailing on her maiden voyage on 2nd June, has been fitted with communications equipment and navigational aids supplied by The Marconi International Marine Communication Company, Limited, and a television system designed and installed by Marconi's Wireless Telegraph Company, Limited, to an order negotiated by Marconi Marine.

In Canberra Marconi Marine have installed communications equipment and navigational aids similar to the very successful installation which the Company provided for the P & O - Orient liner Oriana.

Canberra has a high-powered single sideband transmitter, with two associated receivers and terminal rack equipment giving passengers and ships' officers facilities to make a long-distance radiotelephone call to anywhere in the world. Such a call is made with absolute privacy, the use of speech inverters rendering it unintelligible to anyone other than the person for whom it is intended.

Normal telegraph traffic will be handled by a "Globespan" transmitter and three "Atalanta" receivers. This high-powered all-purpose transmitter will also be used for radiotelephone

calls in addition to the main single sideband installation.

A "Reliance" transmitter, "Alert" receiver and an "Autokey" form the emergency installation in the radio office and two of the Canberra's motor lifeboats contain "Salvare" emergency equipment with powerful searchlights also operating from the battery supplies.

Marconi Marine's "Lodestar" automatic direction-finder has been fitted in Canberra's radio room. Operational simplicity is the chief design feature of "Lodestar"; once tuned to a radio-beacon frequency the pointer automatically swings round to the true bearing with no other manual adjustments. A successful new method of presenting depth information is also incorporated in the Canberra's bridge equipment. Called the "Metron", it gives a clear, unambiguous pointer indication of the actual depth of water below the vessel at any second. Working with the high-powered "Seagraph III" dry-paper recording echometer, "Metron" employs a simple form of computer to differentiate between the true bottom echo and spurious re-echoes and interference, feeding a positive signal to the meter which will record a change of depth immediately.

Canberra's television installation follows the pattern successfully inaugurated in Oriana, which had the first seagoing system of its kind in the world. During Oriana's maiden voyage B.B.C. television programmes were still being received quite clearly when the vessel was more than 150 miles from the U.K.

coast and this good reception continued in other parts of the world where television programmes were being transmitted.

Canberra is equipped with a similar installation providing a completely co-ordinated internal and off-air television service anywhere in the world.

The installation provides for the reception of television broadcasts employing the 405-line system used in Britain, the 625-line system used in Australia and the greater part of Europe, and the 525-line system used in the United States, Canada, Japan and some South American countries.

Wherever alternative programmes are available, viewers will be able to change from one channel to another by using the normal channel selector switch on the receiver. Thus, while the ship is in the United Kingdom area, either B.B.C. or I.T.A. programmes can be selected at the receiver; and elsewhere the same switch will select any of the local stations operating in Bands I and III.

A major feature of the system is the use of standard proprietary receivers, the incoming broadcast programmes being processed as appropriate in a central television control room adjacent to the radio office before distribution to the receivers. Initially, some forty television receivers, with 17, 21 or 24 inch screens will be used in public rooms and first class cabins, but provision has been made for increasing the number to a maximum of 350 at a later date, without any alteration to the basic installation.

The processing equipment includes two Marconi Vidicon camera channels which also form part of Canberra's closed-circuit installation. Each of the two camera channels is associated with a separate 16 mm. film projector and a separate slide projector.

On the high seas, out of range of television transmitters, the liner's passengers will be entertained by closed-circuit programmes mainly derived from a library of 16 mm. films; but the installation is very versatile - the cameras can be used to screen studio scenes, interviews and outside shots with no additional equipment. One of Canberra's public rooms has been wired for use as a television studio; a camera can be plugged in and used for plays, interviews and amateur shows produced by the liner's staff and passengers. Outside shots, particularly on the bridge which is close to the television control room, will give passengers an insight into the duties carried out by the navigating officers without interfering with the navigation or running of the vessel.

Television, already proved in Oriana as a most successful addition to the amenities of a passenger liner, will undoubtedly be as popular among Canberra's passengers and crew - an added attraction to the leisure afforded by ocean travel.

With the Compliments of:  
The Marconi International Marine Communication Co., Ltd.,  
Marconi House,  
CHELMSFORD, Essex.

Telephone: Chelmsford 3221 (Ext. 304 or 167)